



**DEPARTMENT OF TRANSPORTATION**

**[4910-22-P]**

**Federal Highway Administration**

**Connected Vehicle Pilot Deployment Program; Request for Information**

**AGENCY:** Federal Highway Administration (FHWA), Department of Transportation (DOT).

**ACTION:** Notice.

**SUMMARY:** This notice is a Request for Information (RFI) and comments that will be used to help refine the plans for one or more pilot deployments, which combines connected vehicle and mobile device technologies innovations to improve traveler mobility and system productivity, while reducing environmental impacts and enhancing safety. The FHWA anticipates a procurement action for one or more pilot deployment concepts in 2015. The FHWA is issuing this RFI in collaboration with, and on behalf of, other agencies within the DOT, specifically the Federal Transit Administration, the Federal Motor Carrier Safety Administration, National Highway Traffic Safety Administration (NHTSA), and the Office of the Assistant Secretary for Research and Technology. Feedback and comments on any aspect of the RFI are welcome from all interested public, private, and academic entities. While all feedback is welcome, DOT is particularly interested in feedback on the questions provided in the last section of this RFI.

**DATES:** Responses to this RFI should be submitted by 11:59 p.m., e.t., on [Insert date 30 days after date of publication in the Federal Register].

**ADDRESSES:** Responses to this RFI should be delivered electronically as an e-mail or attachment to an e-mail sent to [CVPilots@dot.gov](mailto:CVPilots@dot.gov).

**FOR FURTHER INFORMATION CONTACT:** For questions about the program discussed herein, contact Katherine Hartman, CV Pilots Program Lead, ITS Joint Program Office, 202-366-2742, kate.hartman@dot.gov. For legal questions, interpretations and counsel, please contact Adam Sleeter, Office of the Chief Counsel, 202-366-8839, adam.sleeter@dot.gov, 1200 New Jersey Avenue, SE., Washington, DC 20590. Office hours for the FHWA are from 8:00 a.m. to 4:30 p.m., e.t., Monday through Friday, except Federal holidays.

**SUPPLEMENTARY INFORMATION:**

**Background**

Based on the successful results of the connected vehicle research program, and the recent decision by NHTSA to pursue vehicle to vehicle communications safety technology for light vehicles, a robust connected vehicle pilots program is envisioned as a mechanism to spur the implementation of connected vehicle technology. These pilots will serve as initial implementations of connected vehicle technology deployed in real world settings with the aim of delivering near-term safety, mobility, and environmental benefits to the public.

The DOT connected vehicle research program is a multimodal initiative that aims to enable safe, interoperable networked wireless communications among vehicles, infrastructure, and personal communications devices. Connected vehicle research is sponsored by the DOT and others to leverage the potentially transformative capabilities of wireless technology to make surface transportation safer, smarter, and greener. Research has resulted in a considerable body of work supporting pilot deployments, including concepts of operations and prototyping for more than two dozen applications.

Concurrent Federal research efforts developed critical cross-cutting technologies and other enabling capabilities required to integrate and deploy applications. Descriptions of the following relevant research products, developed by the component connected vehicle research programs, can be found at the locations provided in footnotes:

- Dynamic Mobility Applications Program<sup>1</sup>
- Real-Time Data Capture and Management Program<sup>2</sup>
- Applications for the Environment: Real-Time Information (AERIS) Program<sup>3</sup>
- Road-Weather Management Program<sup>4</sup>
- Safety Pilot Model Deployment<sup>5</sup>
- Vehicle-to-Infrastructure (V2I) Safety Program<sup>6</sup>
- Vehicle-to-Vehicle (V2V) Safety Program<sup>7</sup>

These programs seek to identify, develop, and deploy applications that leverage the full potential of trusted communications among connected vehicles, travelers, and infrastructure to better inform travelers, enhance current operational practices, and transform surface transportation systems management. In 2012-2013, the connected vehicle research program conducted the Safety Pilot Model Deployment in Ann Arbor, Michigan, to assess the potential of V2V and other safety applications to reduce crashes and improve roadway system safety.

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<sup>1</sup> <http://www.its.dot.gov/dma/>

<sup>2</sup> [http://www.its.dot.gov/data\\_capture/data\\_capture.htm](http://www.its.dot.gov/data_capture/data_capture.htm)

<sup>3</sup> <http://www.its.dot.gov/aeris/>

<sup>4</sup> [http://www.its.dot.gov/connected\\_vehicle/road\\_weather.htm](http://www.its.dot.gov/connected_vehicle/road_weather.htm)

<sup>5</sup> [http://www.its.dot.gov/safety\\_pilot/](http://www.its.dot.gov/safety_pilot/)

<sup>6</sup> <http://www.its.dot.gov/research/v2i.htm>

<sup>7</sup> <http://www.its.dot.gov/research/v2v.htm>

Building on the collective body of connected vehicle research work, the Connected Vehicle Pilot Deployment Program seeks preliminary operational deployments of connected vehicle applications that synergistically capture and utilize new forms of connected vehicle and mobile device data to improve multimodal surface transportation system performance and enable enhanced performance-based systems management. The applications developed as connected vehicle applications include support for improved decisionmaking by both system users (travelers) and system managers. The intent is to deploy site-tailored collections of applications that address specific local needs while laying a foundation for broader regional and national deployment. Pilot deployment sites selected in this effort will focus on combinations of applications that result in improved and measureable system performance in one or more of the following areas:

- System Productivity
- Mobility, including impact on freight movements
- Livability/Accessibility (accessibility is defined as the ability to reach goods, services, and activities)
- Environment/Fuel Use
- Traveler/System Safety, including advising of potentially unsafe conditions and mitigating the impact of events that may cause vehicle crashes

### **Purpose of the Notice**

The DOT seeks comments and innovative ideas from the public sector, private sector, and academic communities concerning the pilot program described in this RFI.

While comments are welcome on any area of the RFI, the DOT is particularly interested in responses to the questions listed at the end of this RFI.

### **Connected Vehicle Pilot Deployment Program Description**

This Connected Vehicle Pilot Deployment Program envisions multiple pilot deployments with an initial wave starting in calendar year 2015. The program seeks to spur innovation among early adopters of connected vehicle application concepts, using best available and emerging technologies. The pilot deployments are expected to integrate connected vehicle research concepts into practical and effective elements, enhancing existing operational capabilities. The intent of these pilot deployments is to encourage partnerships of multiple stakeholders (e.g., private companies, States, transit agencies, commercial vehicle operators, and freight shippers) to deploy applications utilizing data captured from multiple sources (e.g., vehicles, mobile devices, and infrastructure) across all elements of the surface transportation system (i.e., transit, freeway, arterial, parking facilities, and tollways) to support improved system performance and enhanced performance-based management. The pilot deployments are also expected to support an impact assessment and evaluation effort that will inform a broader cost-benefit assessment of connected vehicle concepts and technologies.

The FHWA anticipates using go/no-go milestones to align Federal funding with pilot deployment progress throughout concept development and implementation. Example milestones include the completion of site partnerships, coordination agreements, and concept development documents and equipment test readiness. The FHWA anticipates selecting multiple sites to initiate pilot deployment planning. However, this initial group may be reduced in number prior to actual deployment.

The pilot deployments should address the following research questions:

- Can connected applications be successfully deployed as a part of operational practice, leveraging vehicles and mobile devices (in-vehicle or outside of the vehicle) both as data sources and application platforms?
- Can system productivity, environmental impact, traveler mobility, and transportation safety be measured and enhanced in innovative and meaningful ways by combining existing and emerging mobile data sources (e.g., by using vehicles and mobile devices as data sources)?
- To what extent can connected vehicle technologies and data be used to support real-time, performance-based management of roadways, transit systems, and freight carriers?
- What are the institutional, legal, and technical issues that may help or hinder the use of connected vehicle technologies?
- What wireless and other communications media can be combined to make large-scale data capture and mobility applications cost effective?
- How can diverse data sources be efficiently integrated and utilized?
- Can customer satisfaction with demonstrated applications be measured?
- Are State and local agencies prepared to implement and maintain connected vehicle technologies?
- How effective is a security credential management system in enabling connected vehicle communications?

### **Connected Vehicle Pilot Program Requirements Under Consideration**

All candidate sites and prospective partners will be required to address the following fundamental aspects of the Connected Vehicle Pilot Deployment Program concept, including:

- *Innovative deployment of multiple connected vehicle applications.*

Applications should exploit the value of integrated multisource data (vehicles, infrastructure, and mobile devices). Multiple connected vehicle applications must be deployed together in a complementary manner to improve overall pilot deployment cost-effectiveness. Pilot deployment concepts should cost-effectively leverage captured connected vehicle and mobile device data to provide innovative services to multiple users, including system managers.

Pilot deployments should build upon the DOT-sponsored research. Prototypes of selected connected vehicle applications are currently under development and testing, with demonstrations planned for calendar year 2014. Some concepts of operations, system requirements, and design documents will be made available, as well as algorithms and source code associated with these prototypes. A pilot deployment concept need not include all of the specific technologies identified in the connected vehicle research effort. However, each pilot deployment should combine concepts from multiple DOT application development efforts. A table of connected vehicle applications developed by DOT can be found at

[http://www.its.dot.gov/connected\\_vehicle/connected\\_vehicle\\_apps.htm](http://www.its.dot.gov/connected_vehicle/connected_vehicle_apps.htm).

- *Multisource data approach leveraging vehicle data via Dedicated Short Range Communications (DSRC).* Pilot deployments should feature frequent capture and systematic integration of data from an appropriate broad range of sources. Potential

sources may include multiple types of infrastructure-based sensors, transit vehicle systems (bus and rail), a full range of vehicle types acting as mobile probes (including freight carriers and transit vehicles), and travelers moving between modes as they complete trips. At a minimum, vehicles must be deployed as one data source and DSRC deployed as one of the communication technologies.

- *Operational deployments.* Pilot deployments should be conducted in operational transportation networks. Pilot deployments set in laboratory or closed facility test environments are precluded from consideration. Preference will be shown to pilot deployment proposals that combine data drawn from fixed infrastructure-based sensor systems and contemporaneous populations of vehicles or travelers and mobile devices participating as mobile probes. Pilot deployments are intended to become integrated elements of current and future operational practice.

- *Performance measurement.* Well-defined, quantitative performance measures and a clear strategy for evaluating these impacts must be a part of any pilot deployment.

- *Diverse practical deployment environments.* Pilot deployments should include practical and effective connected vehicle deployments that include bi-directional communications between vehicles and transportation management systems. The DSRC vehicle communications must be included, but a deployment concept may also include additional data sources (e.g., mobile devices and infrastructure sensors) and other communication media. Pilot deployments should focus on achieving practical and measureable improvements that showcase the near-term potential of connected vehicle technology.



- *No driver distraction effects.* Piloted applications will involve collection of information from moving vehicles and presentation of information to drivers. Those activities must be conducted in a manner that will not distract drivers or compromise safety. Pilot deployments will not include applications that require driver interaction while operating a vehicle. See [www.distraction.gov](http://www.distraction.gov) for additional information on distracted driving.

- *Data sharing.* A required element of the pilot deployments is the systematic collection of data from both mobile and fixed sources. It is the intent to provide open access to the data through the DOT Data Capture and Management Program. The data may be made available as the pilot deployment is conducted, or made available shortly after the conclusion of the pilot deployment. The data is intended to support concurrent research activity and connected vehicle application development. If necessary, data should be transformed or aggregated to protect privacy, and the Government will consider allowing transformation or aggregation to protect intellectual property rights.

- *Independent evaluation.* Pilot deployments will be conducted with parallel and independent impact evaluations and target user satisfaction assessment. An independent evaluation contractor will assist in planning and executing an evaluation plan and author a national evaluation report.

- *Security Credentialing Management System.* Pilot deployments shall make appropriate use of the latest ITS standards for trusted information exchange.<sup>8</sup> Pilot

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<sup>8</sup> <http://www.standards.its.dot.gov/>

sites will be expected to connect to a Security Credential Management System. A DOT-provided system will be available for the purposes of the pilot deployments.

- *Basic Safety Message broadcast.* All in-vehicle equipment deployed as a part of the pilot deployment are expected to transmit an SAE J2735 Basic Safety Message<sup>9</sup> even if crash avoidance applications are not part of the pilot site deployment plan.

## **RFI Guidelines**

Responses to this notice are not offers and cannot be accepted by the Government to form a binding contract or issue a grant. Information obtained as a result of this RFI may be used by the Government for program planning on a non-attribution basis. This RFI notice is NOT a solicitation for proposals, applications, proposal abstracts, or quotations. This RFI notice is not to be construed as a commitment on the part of the Government to award a contract or grant, nor does the Government intend to directly pay for any information or responses submitted as a result of this RFI notice.

The Government prefers that submissions NOT include any information that might be considered proprietary or confidential. The Government intends to publicly release a summary of responses to this RFI. Such a summary may identify the number and types of responders (e.g., public agency, private entity, or academic institution). If you wish to submit any information under a claim of confidentiality, you should submit your complete submission, including the information you claim to be confidential commercial information, via e-mail to the address given under FOR FURTHER INFORMATION CONTACT, above. If you submit materials containing information identified as confidential commercial information, you should include a cover letter

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<sup>9</sup> [http://www.its.dot.gov/safety\\_pilot/pdf/Vehicle\\_Awareness\\_Device\\_Specification-r3-5--20111202.pdf](http://www.its.dot.gov/safety_pilot/pdf/Vehicle_Awareness_Device_Specification-r3-5--20111202.pdf)

setting forth the reasons you believe the information qualifies as confidential commercial information. (49 CFR 7.13(c)(4) and 7.17) If we receive a request to examine or copy this information, we will treat it as any other request under the Freedom of Information Act (5 U.S.C. 552), and process the request in accordance with the procedures found in 49 CFR 7.17.

Responses should clearly identify the name(s) of the responding organization(s) or individual(s) and a designated point of contact, to include address, e-mail, and phone number.

### **Summary of Questions**

Specific questions posed in this notice follow. Responders are reminded that feedback or comments on any aspect of this notice are welcome from all interested public, private, and academic entities. While all feedback is welcome, the DOT is particularly interested in feedback on the following questions. Respondents may respond, to some, all, or none of these specific questions:

1. The DOT envisions an initial wave of pilot deployments to be awarded and commence in 2015. Additional waves may follow this first wave, through 2017. After a 12-18-month planning and deployment phase for each selected pilot site, a period of pilot operational testing and data collection is expected. The operational period, results analysis, and publication of final results are anticipated to occur over a period that does not exceed 18 months. Is this schedule too cautious, too ambitious, or about right?

2. There are important advantages to conducting multiple deployments, including diversity of innovation, technical approaches, and deployment environments and a more comprehensive assessment of connected vehicle technology impact and

potential. At the same time, the breadth of envisioned applications and the potential costs of deployment argue for conducting a small number of deployments with critical mass.

Is it feasible to achieve the goals of the program with multiple deployment sites? What is the rough order of magnitude of resources (e.g., cost, vehicles, roadside installations, devices, or size of geographic area) expected to enable a meaningful pilot deployment in a single site? What is an appropriate Federal/site cost share split?

3. The DOT intends to provide open appropriate access to the data collected as part of this effort through the Real-Time Data Capture and Management Program. Appropriate access includes suitable protections regarding data ownership, intellectual property rights, and privacy.

a. Do you see value in broadly sharing the data with other researchers?

b. Will such data sharing inhibit participation in the pilot deployment program? If so, what mitigation actions will encourage participation?

c. How should the Research Data Exchange<sup>10</sup> be used in support of the pilot deployments? Should data be uploaded as the deployments are being conducted (i.e., real-time feeds) or as daily archives?

4. To the greatest extent possible, it is the intent of the Connected Vehicle Pilot Deployment Program that algorithms and source code associated with new applications or application enhancements, and funded as a part of these pilot deployments, be made freely available under open source agreements on the Open Source Applications Development Portal.<sup>11</sup> The DOT has identified an open source approach as

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<sup>10</sup> <https://www.its-rde.net/>

<sup>11</sup> <http://itsforge.net/>

a method to ensure sharing of Government-funded research products and shorten the time lag between research and deployment.

- a. Do you see value in making algorithms and application source code funded by this pilot deployment program broadly available?
  - b. Will such an open source approach inhibit participation in the pilot deployment effort? If so, what mitigation actions will encourage participation?
  - c. Should any particular type of application be provided in open source format (e.g., safety applications, non-safety applications, or mobility applications)?
  - d. The DOT seeks to encourage commercially developed applications based on these pilot deployments. What other avenues do you see for rapid commercialization besides an open source approach?
5. The DOT wants to use these pilot deployments to support early implementation of connected vehicle technology. Connected vehicle technology needs to be interoperable and, as a result, requires consistency across implementations. What is the role of the Connected Vehicle Reference Implementation Architecture?<sup>12</sup>
6. How should the pilot programs be used to support early implementation of technologies enabling vehicle-to-vehicle applications?
7. The DOT has invested in connected test bed development.<sup>13</sup> What role should the affiliated connected vehicle test beds play in preparing or conducting pilot deployments?

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<sup>12</sup> <http://www.standards.its.dot.gov/DevelopmentActivities/CVReference>

<sup>13</sup> <http://www.its.dot.gov/testbed.htm>

8. The American Association of State Highway and Transportation Officials has prepared a connected vehicle footprint analysis.<sup>14</sup> To what extent can deployment scenarios identified in that analysis be achieved as a part of a pilot deployment?

9. How can the potential value of connected vehicle applications best be measured and estimated in concert with pilot deployment activities?

10. Based on the nature of the pilot deployments, DOT believes that a multimodal cooperative effort involving private and public sector organizations will be required. Feedback is requested on issues including the challenges in forming the teams as a lead organization, a partner, or another participant. What forms or demonstrations of commitment by the participants are reasonable and appropriate requirements of respondents to a solicitation for the pilot deployment program (e.g. letters of intent, proposed matching requirements, or draft project plans)?

Issued on: February 28, 2014.

Gregory G. Nadeau,  
Deputy Administrator,  
Federal Highway Administration.

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<sup>14</sup> <http://ssom.transportation.org/Documents/Executive%20Briefing.pdf>